

JAPANESE [JP,2000-067223,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

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CLAIMS

[Claim(s)]

[Claim 1] The file creation approach which hierarchizes image data on two or more level, obtains the hierarchy data for every hierarchy, and is characterized by constituting an image file with each hierarchy data with which it added to said each hierarchy data, and this side channel information was added by making into side channel information information about the predetermined field of the image expressed by said image data.

[Claim 2] The file creation approach according to claim 1 characterized by dividing said hierarchy data into further two or more fields.

[Claim 3] It is the file transfer control approach of controlling the storage with which the image file created by the file creation approach according to claim 1 or 2 was memorized, and transmitting this image file. The side channel information included in the hierarchy data of the predetermined level in said image file is acquired. The file transfer control approach characterized by controlling said storage to judge the significance for every field of an image expressed by said image data based on this side channel information, and to transmit the hierarchy data of level according to said significance for every field of said image.

[Claim 4] The file transfer control approach according to claim 3 characterized by acquiring the side channel information comparatively included in the hierarchy data of a low.

[Claim 5] File creation equipment characterized by to have a hierarchization means to hierarchize image data on two or more level, and to obtain the hierarchy data for every hierarchy, an addition means add to said each hierarchy data by making into side channel information information about the predetermined field of the image expressed by said image data, and a file creation means constitute an image file with each hierarchy data with which this side channel information was added.

[Claim 6] File creation equipment according to claim 5 characterized by having further a division means to divide said hierarchy data into two or more fields.

[Claim 7] It is the file transfer control unit which controls the storage with which the image file created by file creation equipment according to claim 5 or 6 was memorized, and transmits this image file. A side channel information acquisition means to acquire the side channel information included in the hierarchy data of the predetermined level in said image file, A decision means to judge the significance for every field of an image expressed by said image data based on this side channel information, The file transfer control unit characterized by having the control means which controls said storage to transmit the hierarchy data of level according to said significance for every field of said image.

[Claim 8] Said side channel information acquisition means is a file transfer control unit according to claim 7 characterized by being a means to acquire the side channel information comparatively included in the hierarchy data of a low.

[Claim 9] The record medium which recorded the program for making a computer perform the file-creation approach of having the procedure hierarchize image data on two or more level, and obtain the hierarchy data for every hierarchy, the procedure which adds to each of said hierarchy data by making into side channel information information about the predetermined field of the image expressed by said image data, and the procedure which constitutes an image file

with each hierarchy data with which this side channel information was added and in which computer read is possible.

[Claim 10] The record medium which is characterized by having further the procedure of dividing said hierarchy data into two or more fields and in which computer read according to claim 9 is possible.

[Claim 11] It is the record medium which recorded the program for making a computer perform the file transfer control approach of controlling the storage with which the image file created by the file creation approach according to claim 1 or 2 was memorized, and transmitting this image file and in which computer read is possible. The procedure which acquires the side channel information that said program is included in the hierarchy data of the predetermined level in said image file, The procedure of judging the significance for every field of an image expressed by said image data based on this side channel information, The record medium which is characterized by having the procedure which controls said storage to transmit the hierarchy data of level according to said significance for every field of said image and in which computer read is possible.

[Claim 12] The procedure which acquires said side channel information is a record medium which is characterized by being the procedure which acquires the side channel information comparatively included in the hierarchy data of a low and in which computer read according to claim 11 is possible.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the record medium which recorded the program for making the file creation approach that the information on the predetermined field included in an image creates the image file added as side channel information and equipment, the approach of controlling a transfer of this image file, and an equipment list perform these approaches to a computer and in which computer read is possible.

[0002]

[Description of the Prior Art] After reading the radiation image of the photographic subject recorded on the accumulative fluorescent substance sheet or the film, obtaining image data and performing the suitable image processing for this image data, reproducing an image with a display etc. is performed in various fields. The technique of digital radiography called the computed radiography especially by combination with a computer is developed, and clinical application of the various TEJITARU radiography is carried out in recent years.

[0003] This digital radiography has the fundamentally different features from the radiography of the conventional analog form in that image data is quantitatively analyzable. The technique called computer (computer) exchange diagnostic imaging or CADM (Computer Aided Diagnosis of Medical Image) aiming at utilizing the features of this digital radiography more positively is especially proposed as an object for a medical diagnosis of the body.

[0004] This computer exchange diagnostic imaging etc. assists the diagnosis through the image interpretation of radiogram in a medical site. That is, in the former, the specialist did the observation interpretation of radiogram of the radiation image reproduced with displays, such as record media, such as a film, and CRT, by viewing, and it was trying to discover unusual tumor shading, high-concentration minute mineralization shading, etc. showing cancer etc. as a thing at an early stage (henceforth [these are named generically and] abnormality shading). However, according to the difference of the image interpretation-of-radiogram capacity between the interpretation-of-radiogram persons who do the observation interpretation of radiogram of the radiation image etc., such abnormality shading may be overlooked or misapprehension by the subjective judgment may be produced.

[0005] Then, by detecting the abnormality shading candidate considered to be abnormality shading based on image data in calculating-machine exchange diagnostic imaging, displaying marking on the detected part, and calling the interpretation-of-radiogram person's of a radiation image attention Or by showing quantitatively the characteristic thing of the abnormality shading candidate who detected as an ingredient which is useful to objective decision of an interpretation-of-radiogram person an oversight, misapprehension, etc. by the above interpretation-of-radiogram persons are prevented beforehand, and improvement in the diagnostic engine performance is aimed at ("mass-shadow detection [in DR image] (iris filter)" Institute of Electronics, Information and Communication Engineers paper magazine [] -- D-II Vol.J75-D-II No.3 P663-670 -- in March, 1992) "Extract of minute calcified opacity with mol follow G filter using multiplet-structure element" same magazine Reference, such as D-II Vol.J75-D-II No.7 P1170 - 1176 July, 1992 etc.

[0006] Moreover, in the equipment which performs this calculating-machine exchange diagnostic imaging, the thing it was made to raise the observation interpretation-of-radiogram engine performance for a diagnosis is proposed by detecting the candidate of abnormality shading from image data, extracting the local data showing a field including this abnormality shading candidate, and displaying this local data separately from the whole image (JP,8-294479,A).

[0007] Moreover, in order to recognize an irradiation field field with a sufficient precision to the image data obtained by taking a photograph using an irradiation field diaphragm, the auxiliary information for performing irradiation field recognition processing to image data is given, and the irradiation field recognition equipment which receives this auxiliary information and was made to perform irradiation field recognition with image data is proposed (Japanese Patent Application No. No. 95619 [nine to]).

[0008]-Furthermore, image recognition is performed to the field considered as the request in the image expressed by image data, required standardization processing conditions are searched for, and the image-processing approach which was made to perform an image processing to all image data based on this standardization processing condition is proposed (JP,60-120349,A).

[0009] On the other hand, as preservation format of image data, although various formats, such as JPEG, GIF, and TIFF, exist, image data is decomposed hierarchical for every resolution or density resolution in recent years, and the format which encodes the data (hierarchy data) for every hierarchy, and carries out compression storage is proposed. Wavelet transform etc. decomposes image data into two or more resolution of every and the hierarchy data for every density resolution, this preservation format encodes this disassembled each resolution or hierarchy data for every density resolution to a hierarchical order, and they is compressed as one file and it specifically saves them.

[0010] This preservation method has the following descriptions.

[0011] (1) Like the DCT method used by the conventional JPEG, since image data is not processed for every block, artifact like block distortion does not arise.

[0012] (2) Since image data is encoded hierarchical, an efficient image transfer is attained that what is necessary is to transmit only the information on resolution required in the case of an image data transfer.

[0013] (3) Since image data is decomposed into multiplex resolution or multiplex density resolution, various image processings, such as frequency emphasis processing, can be performed comparatively easily.

[0014] (4) Coincidence decomposition with the space and the frequency in multiplex resolution analysis is possible, orthogonal transformation is performed in the large range to the low frequency field which affects coding effectiveness greatly, and since orthogonal transformation becomes possible in the narrow range to a high frequency field, even if a quantization noise occurs in the edge periphery in an image, the spatial breadth can be stopped. For this reason, a noise is hard to be perceived.

[0015] Moreover, although the file format which can memorize two or more data with which properties differ in one file like the FlashPix file which Eastman Kodak Co. proposes is proposed, it is also possible to keep the hierarchy data disassembled also into the file of such FlashPix specification by multiplex resolution or multiplex density resolution.

[0016] Thus, the resolution or density resolution of data of each hierarchy can constitute image data from data of mutually different two or more level by decomposing image data into multiplex resolution or multiplex density resolution.

[0017] Furthermore, it is also possible to constitute image data from data of two or more level with which the quality of a playback image differs about the same image. That is, the image data obtained by thawing if image data is compressed reversibly does not have degradation, and the image data obtained by thawing if it compresses irreversible deteriorates according to the sampling period. Therefore, image data can consist of data of two or more level to which the playback image quality of image data could be changed, and playback image quality was changed by this by whether it compresses reversibly or it compresses irreversible.

[0018]

[Problem(s) to be Solved by the Invention] detecting the field considered as an abnormality

shading candidate's field in an image, an irradiation field field, or a request, and performing a suitable image processing to the detected field, as mentioned above -- the observation interpretation of radiogram -- the playback image which was excellent proper can be obtained. However, in the approach indicated by above-mentioned JP,8-294479,A, since it is necessary to detect an abnormality shading candidate from image data whenever it reproduces an image, long duration is required for detection of a field. Moreover, in the approach indicated by above-mentioned Japanese Patent Application No. No. 95619 [nine to], although an irradiation field field is appropriately detectable, since it is necessary to also transmit auxiliary information to the equipment for detecting with all image data, a data transfer takes long duration. Moreover, if the image data to which processing was performed beforehand is acquired like the approach indicated by above-mentioned JP,60-120349,A, there will be no problem from which a data transfer time and the processing time turn into a long time, but since processing has already been performed, the image data acquired by transfer has the problem that it cannot return to the original image data before processing.

[0019] It aims at offering the record medium which recorded the program for making the approach of creating the image file which can save original image data as it is and equipment , the file transfer control approach that controls a transfer of this image file , and an equipment list perform these approaches to a computer while transmitting efficiently the data of the field which this invention is make in view of the above-mentioned situation , and is consider as the request in an image and in which computer read is possible .

[0020]

[Means for Solving the Problem] The file creation approach by this invention hierarchizes image data on two or more level, obtains the hierarchy data for every hierarchy, and is characterized by constituting an image file with each hierarchy data with which it added to said each hierarchy data, and this side channel information was added by making into side channel information information about the predetermined field of the image expressed by said image data.

[0021] It says constituting from two or more hierarchy data from which playback image quality, resolution, density resolution, etc. differ image data by constituting image data etc. from the data with which the quality of a playback image differs here like the data which carried out lossless compression and the data which carried out lossy compression which constitute image data from two or more data with which resolution differs from density resolution by decomposing ["which hierarchizes image data on two or more level"] image data into multiplex resolution and/or multiplex density resolution. Moreover, in this invention, the resolution, density resolution, and/or playback image quality which were mentioned above as it is a "high level" mean a high thing, it is resolution and concentration decomposition as it is a "low", and/or playback image quality means a low thing.

[0022] Moreover, the thing of fields where the important photographic subject is included in the image, such as an irradiation field field when a "predetermined field" takes a photograph using an abnormality shading candidate's field for example, in a medical-application image and an irradiation field diaphragm, is said.

[0023] In addition, in the file creation method by this invention, it is desirable to divide said hierarchy data into two or more fields like for example, a tile field.

[0024] The file transfer control approach by this invention is the file transfer control approach of controlling the storage with which the image file created by the file creation approach by this invention was memorized, and transmitting this image file. The side channel information included in the hierarchy data of the predetermined level in said image file is acquired. Based on this side channel information, the significance for every field of an image expressed by said image data is judged, and it is characterized by controlling said storage to transmit the hierarchy data of level according to said significance for every field of said image.

[0025] In addition, it is desirable that it is the side channel information comparatively included in the hierarchy data of a low as side channel information to acquire.

[0026] The file-creation equipment by this invention is characterized by to have a hierarchization means hierarchize image data on two or more level, and obtain the hierarchy data for every hierarchy, an addition means add to said each hierarchy data by making into side

channel information information about the predetermined field of the image expressed by said image data, and a file-creation means constitute an image file with each hierarchy data with which this side channel information was added.

[0027] In addition, in the file creation equipment by this invention, it is desirable to have further a division means to divide said hierarchy data into two or more fields.

[0028] The file transfer control unit by this invention is a file transfer control unit which controls the storage with which the image file created by the file creation equipment by this invention was memorized, and transmits this image file. A side channel information acquisition means to acquire the side channel information included in the hierarchy data of the predetermined level in said image file, It is characterized by having a decision means to judge the significance for every field of an image expressed by said image data, and the control means which controls said storage to transmit the hierarchy data of level according to said significance for every field of said image based on this side channel information.

[0029] Moreover, as for said side channel information acquisition means, in the file transfer control device by this invention, it is desirable that it is a means to acquire the side channel information comparatively included in the hierarchy data of a low.

[0030] In addition, the file creation approach and the data transfer control approach by this invention may be recorded on the record medium in which computer read is possible as a program for performing a computer, and may be offered.

[0031]

[Effect of the Invention] Since it was made to give each hierarchy data by making into side channel information information on the predetermined field included in the image expressed by image data according to the file creation approach of this invention, and equipment, the information on the predetermined field in the image can be acquired by acquiring side channel information. For this reason, the operation time for it to become unnecessary to process for detecting a field to image data, and for this detect a field can be shortened. Moreover, since the information on a predetermined field was given to the side channel, original image data will be saved in the condition that processing is not performed at all.

[0032] Moreover, according to the file transfer control approach and equipment of this invention, the side channel information included in the hierarchy data of the predetermined level in an image file is acquired first, and significance is judged for every field of the image expressed by image data based on this side channel information. And storage is controlled to transmit the hierarchy data of level according to significance for every field of an image. For example, the hierarchy data of a high level are transmitted about the field judged that significance is high, and the hierarchy data of a low are transmitted about the field judged that significance is low. For this reason, the amount of data to which the amount of data should just transmit the hierarchy data of few lows, and is transmitted as a whole about the field where significance is low can be reduced, and, thereby, data transfer time amount can be shortened.

[0033] Moreover, by acquiring the side channel information comparatively included in the hierarchy data of a low, the amount of data of side channel information can be lessened, and, thereby, data transfer time amount can be shortened further.

[0034] Furthermore, by dividing hierarchy data into two or more fields, the data of a field can be made easy to transmit according to significance, and, thereby, data can be transmitted efficiently.

[0035]

[Embodiment of the Invention] With reference to a drawing, the operation gestalt of this invention is explained below.

[0036] Drawing 1 is the outline block diagram showing the configuration of the file creation equipment by the operation gestalt of this invention. As shown in drawing 1, the file-creation equipment by this invention is equipped with a hierarchization means 1 obtain the hierarchy data for two or more resolution of every, a field information creation means 2 create the field information A about the predetermined field included in the image expressed by the original image data S0, and a file-creation means 3 make include the field information A in each hierarchy data as side channel information on each hierarchy data, and create image file F, by

hierarchizing original image data S0.

[0037] In the hierarchization means 1, as the original image data S0 is the following, it is decomposed into the hierarchy data for every hierarchy. As first shown in drawing 2 (a), wavelet transform of the image data S is carried out, and it is decomposed into four data LL1, HL0, LH0, and HH0 for two or more resolution of every. Here, data LL 1 express the image which reduced every direction of an image to one half, and data HL0, LH0, and HH0 express the image of a vertical edge, a horizontal edge, and a slanting edge component, respectively. And as shown in drawing 2 (b), wavelet transform of the data LL 1 is carried out further, and four data LL2, HL1, LH1, and HH1 are obtained. Here, data LL 2 become a thing showing the image which reduced every direction of data LL 1 to one half at the pan, and data HL1, LH1, and HH1 express the image of the vertical edge of data LL 1, a horizontal edge, and a slanting edge component, respectively. And the data for two or more resolution of every are obtained repeatedly the number of times which considers wavelet transform as a request to the data LL obtained whenever it performs wavelet transform. Furthermore, as shown in drawing 3, tile division is carried out to two or more fields, it encodes for every resolution and the data for every resolution obtained by doing in this way use the encoded data as hierarchy data, as shown in drawing 2 (c) after that.

[0038] The field information creation means 2 creates the field information A about the field included in the image expressed by the original image data S0. For example, about the image which took a photograph using the field (it considers as an irradiation field field below) 4 of an irradiation field diaphragm as shown in drawing 4, the field corresponding to the irradiation field field 4 is extracted, and information on that field is used as bit map data, and let this bit map data be the field information A about a predetermined field.

[0039] In the file creation means 3, the field information A is hierarchized like the original image data S0, and is given to each hierarchy data of the original image data S0. As a gestalt of this grant, each hierarchy data will be included in a RGB channel, and the field information A will be included in a side channel. And image file F is created in this way by giving the hierarchy data of the field information A to each hierarchy data of the original image data S0.

[0040] Thus, created image file F is memorized by the store which memorizes image data to various record media, such as an optical disk, and the image server.

[0041] Subsequently, the file transfer control unit by the operation gestalt of this invention is explained. Drawing 5 is the outline block diagram showing the file transfer structure of a system equipped with the file transfer control device by this operation gestalt. As shown in drawing 5, the file transfer control unit by this operation gestalt Input means 7 to control a transfer of image file F from the image server 15 containing the store 6 with which image file F created by the file creation equipment mentioned above was memorized, and to perform various inputs, such as a keyboard and a mouse, While receiving the hierarchy data contained in image file F based on the directions from the control means 8 which controls a transfer, and a control means 8 A receiving means 9 to output to a transfer means 13 to mention the various directions from a control means 8 later, A decision means 10 to judge the significance of the field in the image expressed by the image data which constitutes image file F, A decryption means 19 to decrypt the hierarchy data contained in transmitted image file F, and to obtain the decode image data S1, It has an image-processing means 11 to perform an image processing to this decode image data S1, and to obtain the processed image data S2, and an image output means 12 to output the processed image data S2 to regenerative apparatus, such as a printer and a monitor. In addition, a transfer means 13 to transmit image file F is connected to storage 6. And the image server 15 is constituted by a store 6 and the transfer means 13, and the file transfer control device by this operation gestalt serves as the terminal 17 connected with the image server 15 through a network 16.

[0042] Subsequently, actuation of the file transfer control unit by this operation gestalt is explained. Drawing 6 is a flow chart which shows the processing performed in the file transfer system equipped with the file transfer control device by this operation gestalt. First, if directions of the purport which transmits image file F from the input means 7 are inputted, a control means 8 directs a transfer of image file F to the image server 15 through a network 16 (step S1). The

transfer means 13 which received transfer directions reads image file F from a store 6, and the field information A included in the side channel of the hierarchy data of a low resolution among each hierarchy data which constitutes image file F is transmitted to a terminal 17 (step S2). This field information A is inputted into the decision means 10 through the receiving means 9 (step S3). In the decision means 10, the significance of the field of an image expressed by the image data which constitutes image file F transmitted is judged based on the field information A (step S4). In this operation gestalt, it is judged that the irradiation field field 4 shown in drawing 4 is an important field where significance is high, and the other field is an unnecessary field where significance is low. And this decision result is inputted into a control means 8.

[0043] In a control means 8, the transfer information on a purport that transmit even the hierarchy data of the highest resolution about an important field, and data are not transmitted about an unnecessary field is transmitted to the image server 15 through a network 16 based on this decision result (step S5). In each hierarchy data in image file F memorized by the store 6, hierarchy data to the hierarchy data of the highest resolution of the minimum resolution read only the data of the tile field (slash section of drawing 7) corresponding to an important field, and the transfer means 13 of the image server 15 transmits them to a terminal 17, as shown in drawing 7 (step S6).

[0044] The receiving means 9 receives the transmitted hierarchy data, and inputs them into the decryption means 19. In the decryption means 19, the transmitted hierarchy data are decrypted and the decode image data S1 corresponding to the irradiation field field 4 is obtained (step S7). The decode image data S1 is inputted into the image-processing means 11, the image processing (melanism processing) smeared away black about fields other than an irradiation field here is performed, and the processed image data S2 is obtained (step S8). The processed image data S2 is inputted into the image output means 12, and playback is presented with it (step S9).

[0045] Thus, since according to this operation gestalt significance is judged based on the field information A included in the side channel of image file F for every field of the image expressed by the image data which constitutes image file F and even the hierarchy data of the highest resolution were transmitted only about the important field based on this significance, the amount of data transmitted as a whole can be reduced, and, thereby, data transfer time amount can be shortened.

[0046] Moreover, in this operation gestalt, since it was made to include the field information A on the predetermined field included in the image expressed by image data in the side channel of image file F, the information on the predetermined field in that image can be acquired by acquiring this field information A. For this reason, the operation time for it to become unnecessary to process for detecting a field to image data, and for this detect a field can be shortened. Moreover, since the field information A on a predetermined field was given to the side channel, the original image data S0 will be saved in the condition that processing is not performed at all.

[0047] In addition, although he is trying not to transmit data about an unnecessary field, you may make it transmit the data of a low resolution in the above-mentioned operation gestalt. Although data transfer time amount becomes long rather than the case where data are not transmitted at all, by this, the transfer time can be shortened as compared with the case where the hierarchy data of high resolution are transmitted.

[0048] Moreover, in the above-mentioned operation gestalt, although even the hierarchy data of the highest resolution are transmitted about the important field, the data of resolution according to the ability to regenerate of the regenerative apparatus which the image output means 12 outputs may be transmitted. For example, what is necessary is to transmit even the data of the highest resolution, when a regenerative apparatus is a printer, and just to transmit even the data of resolution according to CRT, since the data of the highest resolution are unnecessary when a regenerative apparatus is CRT.

[0049] Furthermore, what is necessary is just to transmit the data hierarchized for every density resolution of this in the above-mentioned operation gestalt, when image data is hierarchized and kept for every density resolution although the data which hierarchized the original image data S0 for every resolution, and were hierarchized for every resolution are transmitted. in this case --

an important field -- high concentration -- even the hierarchy data of resolving power are transmitted and data are not transmitted about an unnecessary field -- it is -- it is -- low concentration -- what is necessary is just to transmit the hierarchy data of resolving power moreover, the data which carried out lossless compression of the original image data S0 about the important field when image file F was constituted for every field by lossless compression and the data which carried out lossy compression are transmitted, a high-definition image is reproduced and data are not transmitted about an unnecessary field -- it is -- it is -- what is necessary is to transmit the data which carried out lossy compression and just to reproduce the image of low image quality

[0050] Although the field information A included in the side channel of the hierarchy data of a low resolution in the above-mentioned operation gestalt is acquired further again and the significance of a field is judged, it is not limited to this and the significance of a field may be judged based on the field information A included in the side channel of the hierarchy data of the resolution (for example, the highest resolution) considered as a request.

[0051] Moreover, in the above-mentioned operation gestalt, although the field information A about the field of an irradiation field diaphragm is included in the side channel of each hierarchy data, you may include in the side channel of each hierarchy data by making information about areas of interest, such as a view (graphic form information, such as a round head and a rectangle) of the medical practitioner at the time of diagnosing by reproducing the original image data S0, and tumor, into the field information A. Here, a medical practitioner's view is the graphic form information which the medical practitioner inputted with the mouse, the pen, and the keyboard, and means the field where the area of interest detected lesions, such as tumor in an image, automatically with the predetermined algorithm.

[0052] Thus, also when the information about a medical practitioner's view or area of interest is included in the side channel as field information A When the field information A is acquired like the above-mentioned operation gestalt and the significance for every field of an image is judged Or a medical practitioner's view part or area of interest is judged to be an important field, the other field is judged to be an unnecessary field, even the hierarchy data of the highest resolution are transmitted about an important field and data are not transmitted about an unnecessary field, the hierarchy data of a low resolution will be transmitted. In addition, although image processings, such as gradation processing, are performed to the image data decrypted in the image-processing means 6 in this case, this image processing may be performed only to an important field, and may be performed to the whole image.

[0053] Furthermore, in the above-mentioned operation gestalt, although this invention is applied to the network system which memorizes image file F to the image server 15, and transmits image file F from the image server 15, image file F can be recorded on record media, such as MO, ZIP, and CD-R, and this invention can be applied also to the system which read image file F from this record medium.

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PRIOR ART

[Description of the Prior Art] After reading the radiation image of the photographic subject recorded on the accumulative fluorescent substance sheet or the film, obtaining image data and performing the suitable image processing for this image data, reproducing an image with a display etc. is performed in various fields. The technique of digital radiography called the computed radiography especially by combination with a computer is developed, and clinical application of the various TEJITARU radiography is carried out in recent years.

[0003] This digital radiography has the fundamentally different features from the radiography of the conventional analog form in that image data is quantitatively analyzable. The technique called computer (computer) exchange diagnostic imaging or CADM (Computer Aided Diagnosis of Medical Image) aiming at utilizing the features of this digital radiography more positively is especially proposed as an object for a medical diagnosis of the body.

[0004] This computer exchange diagnostic imaging etc. assists the diagnosis through the image interpretation of radiogram in a medical site. That is, in the former, the specialist did the observation interpretation of radiogram of the radiation image reproduced with displays, such as record media, such as a film, and CRT, by viewing, and it was trying to discover unusual tumor shading, high-concentration minute mineralization shading, etc. showing cancer etc. as a thing at an early stage (henceforth [these are named generically and] abnormality shading). However, according to the difference of the image interpretation-of-radiogram capacity between the interpretation-of-radiogram persons who do the observation interpretation of radiogram of the radiation image etc., such abnormality shading may be overlooked or misapprehension by the subjective judgment may be produced.

[0005] Then, by detecting the abnormality shading candidate considered to be abnormality shading based on image data in calculating-machine exchange diagnostic imaging, displaying marking on the detected part, and calling the interpretation-of-radiogram person's of a radiation image attention Or by showing quantitatively the characteristic thing of the abnormality shading candidate who detected as an ingredient which is useful to objective decision of an interpretation-of-radiogram person an oversight, misapprehension, etc. by the above interpretation-of-radiogram persons are prevented beforehand, and improvement in the diagnostic engine performance is aimed at ("mass-shadow detection [in DR image] (iris filter)" Institute of Electronics, Information and Communication Engineers paper magazine [] — D-II Vol.J75-D-II No.3 P663-670 — in March, 1992) "Extract of minute calcified opacity with mol follow G filter using multiplet-structure element" same magazine Reference, such as D-II Vol.J75-D-II No.7 P1170 - 1176 July, 1992 etc.

[0006] Moreover, in the equipment which performs this calculating-machine exchange diagnostic imaging, the thing it was made to raise the observation interpretation-of-radiogram engine performance for a diagnosis is proposed by detecting the candidate of abnormality shading from image data, extracting the local data showing a field including this abnormality shading candidate, and displaying this local data separately from the whole image (JP,8-294479,A).

[0007] Moreover, in order to recognize an irradiation field field with a sufficient precision to the image data obtained by taking a photograph using an irradiation field diaphragm, the auxiliary information for performing irradiation field recognition processing to image data is given, and the

irradiation field recognition equipment which receives this auxiliary information and was made to perform irradiation field recognition with image data is proposed (Japanese Patent Application No. No. 95619 [nine to]).

[0008] Furthermore, image recognition is performed to the field considered as the request in the image expressed by image data, required standardization processing conditions are searched for, and the image-processing approach which was made to perform an image processing to all image data based on this standardization processing condition is proposed (JP,60-120349,A).

[0009] On the other hand, as preservation format of image data, although various formats, such as JPEG, GIF, and TIFF, exist, image data is decomposed hierarchical for every resolution or density resolution in recent years, and the format which encodes the data (hierarchy data) for every hierarchy, and carries out compression storage is proposed. Wavelet transform etc. decomposes image data into two or more resolution of every and the hierarchy data for every density resolution, this preservation format encodes this disassembled each resolution or hierarchy data for every density resolution to a hierarchical order, and they is compressed as one file and it specifically saves them.

[0010] This preservation method has the following descriptions.

[0011] (1) Like the DCT method used by the conventional JPEG, since image data is not processed for every block, artifact like block distortion does not arise.

[0012] (2) Since image data is encoded hierarchical, an efficient image transfer is attained that what is necessary is to transmit only the information on resolution required in the case of an image data transfer.

[0013] (3) Since image data is decomposed into multiplex resolution or multiplex density resolution, various image processings, such as frequency emphasis processing, can be performed comparatively easily.

[0014] (4) Coincidence decomposition with the space and the frequency in multiplex resolution analysis is possible, orthogonal transformation is performed in the large range to the low frequency field which affects coding effectiveness greatly, and since orthogonal transformation becomes possible in the narrow range to a high frequency field, even if a quantization noise occurs in the edge periphery in an image, the spatial breadth can be stopped. For this reason, a noise is hard to be perceived.

[0015] Moreover, although the file format which can memorize two or more data with which properties differ in one file like the FlashPix file which Eastman Kodak Co. proposes is proposed, it is also possible to keep the hierarchy data disassembled also into the file of such FlashPix specification by multiplex resolution or multiplex density resolution.

[0016] Thus, the resolution or density resolution of data of each hierarchy can constitute image data from data of mutually different two or more level by decomposing image data into multiplex resolution or multiplex density resolution.

[0017] Furthermore, it is also possible to constitute image data from data of two or more level with which the quality of a playback image differs about the same image. That is, the image data obtained by thawing if image data is compressed reversibly does not have degradation, and the image data obtained by thawing if it compresses irreversible deteriorates according to the sampling period. Therefore, image data can consist of data of two or more level to which the playback image quality of image data could be changed, and playback image quality was changed by this by whether it compresses reversibly or it compresses irreversible.

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EFFECT OF THE INVENTION

[Effect of the Invention] Since it was made to give each hierarchy data by making into side channel information information on the predetermined field included in the image expressed by image data according to the file creation approach of this invention, and equipment, the information on the predetermined field in the image can be acquired by acquiring side channel information. For this reason, the operation time for it to become unnecessary to process for detecting a field to image data, and for this detect a field can be shortened. Moreover, since the information on a predetermined field was given to the side channel, original image data will be saved in the condition that processing is not performed at all.

[0032] Moreover, according to the file transfer control approach and equipment of this invention, the side channel information included in the hierarchy data of the predetermined level in an image file is acquired first, and significance is judged for every field of the image expressed by image data based on this side channel information. And storage is controlled to transmit the hierarchy data of level according to significance for every field of an image. For example, the hierarchy data of a high level are transmitted about the field judged that significance is high, and the hierarchy data of a low are transmitted about the field judged that significance is low. For this reason, the amount of data to which the amount of data should just transmit the hierarchy data of few lows, and is transmitted as a whole about the field where significance is low can be reduced, and, thereby, data transfer time amount can be shortened.

[0033] Moreover, by acquiring the side channel information comparatively included in the hierarchy data of a low, the amount of data of side channel information can be lessened, and, thereby, data transfer time amount can be shortened further.

[0034] Furthermore, by dividing hierarchy data into two or more fields, the data of a field can be made easy to transmit according to significance, and, thereby, data can be transmitted efficiently.

[0035]

[Embodiment of the Invention] With reference to a drawing, the operation gestalt of this invention is explained below.

[0036] Drawing 1 is the outline block diagram showing the configuration of the file creation equipment by the operation gestalt of this invention. As shown in drawing 1, the file-creation equipment by this invention is equipped with a hierarchization means 1 obtain the hierarchy data for two or more resolution of every, a field information creation means 2 create the field information A about the predetermined field included in the image expressed by the original image data S0, and a file-creation means 3 make include the field information A in each hierarchy data as side channel information on each hierarchy data, and create image file F, by hierarchizing original image data S0.

[0037] In the hierarchization means 1, as the original image data S0 is the following, it is decomposed into the hierarchy data for every hierarchy. As first shown in drawing 2 (a), wavelet transform of the image data S is carried out, and it is decomposed into four data LL1, HL0, LH0, and HH0 for two or more resolution of every. Here, data LL 1 express the image which reduced every direction of an image to one half, and data HL0, LH0, and HH0 express the image of a vertical edge, a horizontal edge, and a slanting edge component, respectively. And as shown in

drawing 2 (b), wavelet transform of the data LL 1 is carried out further, and four data LL2, HL1, LH1, and HH1 are obtained. Here, data LL 2 become a thing showing the image which reduced every direction of data LL 1 to one half at the pan, and data HL1, LH1, and HH1 express the image of the vertical edge of data LL 1, a horizontal edge, and a slanting edge component, respectively. And the data for two or more resolution of every are obtained repeatedly the number of times which considers wavelet transform as a request to the data LL obtained whenever it performs wavelet transform. Furthermore, as shown in drawing 3, tile division is carried out to two or more fields, it encodes for every resolution and the data for every resolution obtained by doing in this way use the encoded data as hierarchy data, as shown in drawing 2 (c) after that.

[0038] The field information creation means 2 creates the field information A about the field included in the image expressed by the original image data S0. For example, about the image which took a photograph using the field (it considers as an irradiation field field below) 4 of an irradiation field diaphragm as shown in drawing 4, the field corresponding to the irradiation field field 4 is extracted, and information on that field is used as bit map data, and let this bit map data be the field information A about a predetermined field.

[0039] In the file creation means 3, the field information A is hierarchized like the original image data S0, and is given to each hierarchy data of the original image data S0. As a gestalt of this grant, each hierarchy data will be included in a RGB channel, and the field information A will be included in a side channel. And image file F is created in this way by giving the hierarchy data of the field information A to each hierarchy data of the original image data S0.

[0040] Thus, created image file F is memorized by the store which memorizes image data to various record media, such as an optical disk, and the image server.

[0041] Subsequently, the file transfer control unit by the operation gestalt of this invention is explained. Drawing 5 is the outline block diagram showing the file transfer structure of a system equipped with the file transfer control device by this operation gestalt. As shown in drawing 5, the file transfer control unit by this operation gestalt Input means 7 to control a transfer of image file F from the image server 15 containing the store 6 with which image file F created by the file creation equipment mentioned above was memorized, and to perform various inputs, such as a keyboard and a mouse, While receiving the hierarchy data contained in image file F based on the directions from the control means 8 which controls a transfer, and a control means 8 A receiving means 9 to output to a transfer means 13 to mention the various directions from a control means 8 later, A decision means 10 to judge the significance of the field in the image expressed by the image data which constitutes image file F, A decryption means 19 to decrypt the hierarchy data contained in transmitted image file F, and to obtain the decode image data S1, It has an image-processing means 11 to perform an image processing to this decode image data S1, and to obtain the processed image data S2, and an image output means 12 to output the processed image data S2 to regenerative apparatus, such as a printer and a monitor. In addition, a transfer means 13 to transmit image file F is connected to storage 6. And the image server 15 is constituted by a store 6 and the transfer means 13, and the file transfer control device by this operation gestalt serves as the terminal 17 connected with the image server 15 through a network 16.

[0042] Subsequently, actuation of the file transfer control unit by this operation gestalt is explained. Drawing 6 is a flow chart which shows the processing performed in the file transfer system equipped with the file transfer control device by this operation gestalt. First, if directions of the purport which transmits image file F from the input means 7 are inputted, a control means 8 directs a transfer of image file F to the image server 15 through a network 16 (step S1). The transfer means 13 which received transfer directions reads image file F from a store 6, and the field information A included in the side channel of the hierarchy data of a low resolution among each hierarchy data which constitutes image file F is transmitted to a terminal 17 (step S2). This field information A is inputted into the decision means 10 through the receiving means 9 (step S3). In the decision means 10, the significance of the field of an image expressed by the image data which constitutes image file F transmitted is judged based on the field information A (step S4). In this operation gestalt, it is judged that the irradiation field field 4 shown in drawing 4 is an

important field where significance is high, and the other field is an unnecessary field where significance is low. And this decision result is inputted into a control means 8.

[0043] In a control means 8, the transfer information on a purport that transmit even the hierarchy data of the highest resolution about an important field, and data are not transmitted about an unnecessary field, is transmitted to the image server 15 through a network 16 based on this decision result (step S5). In each hierarchy data in image file F memorized by the store 6, hierarchy data to the hierarchy data of the highest resolution of the minimum resolution read only the data of the tile field (slash section of drawing 7) corresponding to an important field, and the transfer means 13 of the image server 15 transmits them to a terminal 17, as shown in drawing 7 (step S6).

[0044] The receiving means 9 receives the transmitted hierarchy data, and inputs them into the decryption means 19. In the decryption means 19, the transmitted hierarchy data are decrypted and the decode image data S1 corresponding to the irradiation field field 4 is obtained (step S7). The decode image data S1 is inputted into the image-processing means 11, the image processing (melanism processing) smeared away black about fields other than an irradiation field here is performed, and the processed image data S2 is obtained (step S8). The processed image data S2 is inputted into the image output means 12, and playback is presented with it (step S9).

[0045] Thus, since according to this operation gestalt significance is judged based on the field information A included in the side channel of image file F for every field of the image expressed by the image data which constitutes image file F and even the hierarchy data of the highest resolution were transmitted only about the important field based on this significance, the amount of data transmitted as a whole can be reduced, and, thereby, data transfer time amount can be shortened.

[0046] Moreover, in this operation gestalt, since it was made to include the field information A on the predetermined field included in the image expressed by image data in the side channel of image file F, the information on the predetermined field in that image can be acquired by acquiring this field information A. For this reason, the operation time for it to become unnecessary to process for detecting a field to image data, and for this detect a field can be shortened. Moreover, since the field information A on a predetermined field was given to the side channel, the original image data S0 will be saved in the condition that processing is not performed at all.

[0047] In addition, although he is trying not to transmit data about an unnecessary field, you may make it transmit the data of a low resolution in the above-mentioned operation gestalt. Although data transfer time amount becomes long rather than the case where data are not transmitted at all, by this, the transfer time can be shortened as compared with the case where the hierarchy data of high resolution are transmitted.

[0048] Moreover, in the above-mentioned operation gestalt, although even the hierarchy data of the highest resolution are transmitted about the important field, the data of resolution according to the ability to regenerate of the regenerative apparatus which the image output means 12 outputs may be transmitted. For example, what is necessary is to transmit even the data of the highest resolution, when a regenerative apparatus is a printer, and just to transmit even the data of resolution according to CRT, since the data of the highest resolution are unnecessary when a regenerative apparatus is CRT.

[0049] Furthermore, what is necessary is just to transmit the data hierarchized for every density resolution of this in the above-mentioned operation gestalt, when image data is hierarchized and kept for every density resolution although the data which hierarchized the original image data S0 for every resolution, and were hierarchized for every resolution are transmitted. in this case -- an important field -- high concentration -- even the hierarchy data of resolving power are transmitted and data are not transmitted about an unnecessary field -- it is -- it is -- low concentration -- what is necessary is just to transmit the hierarchy data of resolving power moreover, the data which carried out lossless compression of the original image data S0 about the important field when image file F was constituted for every field by lossless compression and the data which carried out lossy compression are transmitted, a high-definition image is reproduced and data are not transmitted about an unnecessary field -- it is -- it is -- what is

necessary is to transmit the data which carried out lossy compression and just to reproduce the image of low image quality

[0050] Although the field information A included in the side channel of the hierarchy data of a low resolution in the above-mentioned operation gestalt is acquired further again and the significance of a field is judged, it is not limited to this and the significance of a field may be judged based on the field information A included in the side channel of the hierarchy data of the resolution (for example, the highest resolution) considered as a request.

[0051] Moreover, in the above-mentioned operation gestalt, although the field information A about the field of an irradiation field diaphragm is included in the side channel of each hierarchy data, you may include in the side channel of each hierarchy data by making information about areas of interest, such as a view (graphic form information, such as a round head and a rectangle) of the medical practitioner at the time of diagnosing by reproducing the original image data S0, and tumor, into the field information A. Here, a medical practitioner's view is the graphic form information which the medical practitioner inputted with the mouse, the pen, and the keyboard, and means the field where the area of interest detected lesions, such as tumor in an image, automatically with the predetermined algorithm.

[0052] Thus, also when the information about a medical practitioner's view or area of interest is included in the side channel as field information A. When the field information A is acquired like the above-mentioned operation gestalt and the significance for every field of an image is judged. Or a medical practitioner's view part or area of interest is judged to be an important field, the other field is judged to be an unnecessary field, even the hierarchy data of the highest resolution are transmitted about an important field and data are not transmitted about an unnecessary field, the hierarchy data of a low resolution will be transmitted. In addition, although image processings, such as gradation processing, are performed to the image data decrypted in the image-processing means 6 in this case, this image processing may be performed only to an important field, and may be performed to the whole image.

[0053] Furthermore, in the above-mentioned operation gestalt, although this invention is applied to the network system which memorizes image file F to the image server 15, and transmits image file F from the image server 15, image file F can be recorded on record media, such as MO, ZIP, and CD-R, and this invention can be applied also to the system which read image file F from this record medium.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] detecting the field considered as an abnormality shading candidate's field in an image, an irradiation field field, or a request, and performing a suitable image processing to the detected field, as mentioned above -- the observation interpretation of radiogram -- the playback image which was excellent proper can be obtained. However, in the approach indicated by above-mentioned JP,8-294479,A, since it is necessary to detect an abnormality shading candidate from image data whenever it reproduces an image, long duration is required for detection of a field. Moreover, in the approach indicated by above-mentioned Japanese Patent Application No. No. 95619 [nine to], although an irradiation field field is appropriately detectable, since it is necessary to also transmit auxiliary information to the equipment for detecting with all image data, a data transfer takes long duration. Moreover, if the image data to which processing was performed beforehand is acquired like the approach indicated by above-mentioned JP,60-120349,A, there will be no problem from which a data transfer time and the processing time turn into a long time, but since processing has already been performed, the image data acquired by transfer has the problem that it cannot return to the original image data before processing.

[0019] It aims at offering the record medium which recorded the program for making the approach of creating the image file which can save original image data as it is and equipment , the file transfer control approach that controls a transfer of this image file , and an equipment list perform these approaches to a computer while transmitting efficiently the data of the field which this invention is make in view of the above-mentioned situation , and is consider as the request in an image and in which computer read is possible .

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MEANS

[Means for Solving the Problem] The file creation approach by this invention hierarchizes image data on two or more level, obtains the hierarchy data for every hierarchy, and is characterized by constituting an image file with each hierarchy data with which it added to said each hierarchy data, and this side channel information was added by making into side channel information information about the predetermined field of the image expressed by said image data.

[0021] It says constituting from two or more hierarchy data from which playback image quality, resolution, density resolution, etc. differ image data by constituting image data etc. from the data with which the quality of a playback image differs here like the data which carried out lossless compression and the data which carried out lossy compression which constitute image data from two or more data with which resolution differs from density resolution by decomposing ["which hierarchizes image data on two or more level"] image data into multiplex resolution and/or multiplex density resolution. Moreover, in this invention, the resolution, density resolution, and/or playback image quality which were mentioned above as it is a "high level" mean a high thing, it is resolution and concentration decomposition as it is a "low", and/or playback image quality means a low thing.

[0022] Moreover, the thing of fields where the important photographic subject is included in the image, such as an irradiation field field when a "predetermined field" takes a photograph using an abnormality shading candidate's field for example, in a medical-application image and an irradiation field diaphragm, is said.

[0023] In addition, in the file creation method by this invention, it is desirable to divide said hierarchy data into two or more fields like for example, a tile field.

[0024] The file transfer control approach by this invention is the file transfer control approach of controlling the storage with which the image file created by the file creation approach by this invention was memorized, and transmitting this image file. The side channel information included in the hierarchy data of the predetermined level in said image file is acquired. Based on this side channel information, the significance for every field of an image expressed by said image data is judged, and it is characterized by controlling said storage to transmit the hierarchy data of level according to said significance for every field of said image.

[0025] In addition, it is desirable that it is the side channel information comparatively included in the hierarchy data of a low as side channel information to acquire.

[0026] The file-creation equipment by this invention is characterized by to have a hierarchization means hierarchize image data on two or more level, and obtain the hierarchy data for every hierarchy, an addition means add to said each hierarchy data by making into side channel information information about the predetermined field of the image expressed by said image data, and a file-creation means constitute an image file with each hierarchy data with which this side channel information was added.

[0027] In addition, in the file creation equipment by this invention, it is desirable to have further a division means to divide said hierarchy data into two or more fields.

[0028] The file transfer control unit by this invention is a file transfer control unit which controls the storage with which the image file created by the file creation equipment by this invention was memorized, and transmits this image file. A side channel information acquisition means to

acquire the side channel information included in the hierarchy data of the predetermined level in said image file, It is characterized by having a decision means to judge the significance for every field of an image expressed by said image data; and the control means which controls said storage to transmit the hierarchy data of level according to said significance for every field of said image based on this side channel information.

[0029] Moreover, as for said side channel information acquisition means, in the file transfer control device by this invention, it is desirable that it is a means to acquire the side channel information comparatively included in the hierarchy data of a low.

[0030] In addition, the file creation approach and the data transfer control approach by this invention may be recorded on the record medium in which computer read is possible as a program for performing a computer, and may be offered.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The outline block diagram showing the configuration of the file creation equipment by the operation gestalt of this invention

[Drawing 2] Drawing showing the condition of carrying out wavelet transform of the image data, and encoding for every hierarchy

[Drawing 3] Drawing showing the condition of having carried out tile division of the image

[Drawing 4] Drawing showing the image obtained by taking a photograph using an irradiation field diaphragm

[Drawing 5] The outline block diagram showing the file transfer structure of a system equipped with the file transfer control device by the operation gestalt of this invention

[Drawing 6] The flow chart which shows the processing performed in the file transfer control device by this operation gestalt

[Drawing 7] Drawing showing the important field for every hierarchy data

[Description of Notations]

- 1 Hierarchization Means
- 2 Field Information Creation Means
- 3 File Creation Means
- 6 Storage
- 7 Input Means
- 8 Control Means
- 9 Receiving Means
- 10 Decision Means
- 11 Image-Processing Means
- 12 Image Output Means
- 13 Transfer Means
- 15 Image Server
- 16 Network
- 17 Terminal

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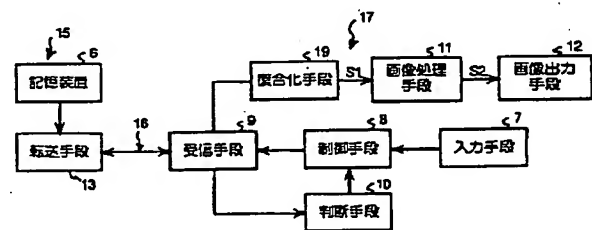
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(54) 【発明の名称】 ファイル作成方法および装置、ファイル転送制御方法および装置並びに記録媒体

(57) 【要約】

【課題】 画像中の所望とする領域のデータを効率よく転送する。

【解決手段】 照射野絞りをを用いて撮影を行うことにより得られたオリジナル画像データ S0 を階層化し、各階層データにより画像ファイル F を構成する。各階層データのサイドチャンネルには、照射野領域を表す領域情報が含まれる。画像ファイル F の転送時に領域情報を受け取り、画像の領域の重要度を判断手段 10 により判断する。判断結果は制御手段 8 に入力され、重要領域については最高解像度の階層データまで、重要でない領域についてはデータを転送しない旨を画像サーバ 15 に入力する。画像サーバ 15 の転送手段 13 はこの情報を受けて、記憶装置 6 から画像ファイル F を読み出し、重要領域についてのみ最高解像度の階層データまで端末 17 に転送する。



【特許請求の範囲】

【請求項1】 画像データを複数レベルに階層化して各階層毎の階層データを得、

前記画像データにより表される画像の所定領域に関する情報をサイドチャンネル情報として前記各階層データに付加し、

該サイドチャンネル情報が付加された各階層データにより画像ファイルを構成することを特徴とするファイル作成方法。

【請求項2】 前記階層データをさらに複数の領域に分割することを特徴とする請求項1記載のファイル作成方法。

【請求項3】 請求項1または2記載のファイル作成方法により作成された画像ファイルが記憶された記憶装置を制御して該画像ファイルを転送するファイル転送制御方法であって、

前記画像ファイルにおける所定レベルの階層データに含まれるサイドチャンネル情報を取得し、

該サイドチャンネル情報に基づいて、前記画像データにより表される画像の領域毎の重要度を判断し、

前記画像の領域毎に前記重要度に応じたレベルの階層データを転送するよう前記記憶装置を制御することを特徴とするファイル転送制御方法。

【請求項4】 比較的低レベルの階層データに含まれるサイドチャンネル情報を取得することを特徴とする請求項3記載のファイル転送制御方法。

【請求項5】 画像データを複数レベルに階層化して各階層毎の階層データを得る階層化手段と、

前記画像データにより表される画像の所定領域に関する情報をサイドチャンネル情報として前記各階層データに付加する付加手段と、

該サイドチャンネル情報が付加された各階層データにより画像ファイルを構成するファイル作成手段とを備えたことを特徴とするファイル作成装置。

【請求項6】 前記階層データを複数の領域に分割する分割手段をさらに備えたことを特徴とする請求項5記載のファイル作成装置。

【請求項7】 請求項5または6記載のファイル作成装置により作成された画像ファイルが記憶された記憶装置を制御して該画像ファイルを転送するファイル転送制御装置であって、

前記画像ファイルにおける所定レベルの階層データに含まれるサイドチャンネル情報を取得するサイドチャンネル情報取得手段と、

該サイドチャンネル情報に基づいて、前記画像データにより表される画像の領域毎の重要度を判断する判断手段と、

前記画像の領域毎に前記重要度に応じたレベルの階層データを転送するよう前記記憶装置を制御する制御手段とを備えたことを特徴とするファイル転送制御装置。

【請求項8】 前記サイドチャンネル情報取得手段は、比較的低レベルの階層データに含まれるサイドチャンネル情報を取得する手段であることを特徴とする請求項7記載のファイル転送制御装置。

【請求項9】 画像データを複数レベルに階層化して各階層毎の階層データを得る手順と、

前記画像データにより表される画像の所定領域に関する情報をサイドチャンネル情報として前記各階層データに付加する手順と、

該サイドチャンネル情報が付加された各階層データにより画像ファイルを構成する手順とを有するファイル作成方法をコンピュータに実行させるためのプログラムを記録したコンピュータ読取り可能な記録媒体。

【請求項10】 前記階層データを複数の領域に分割する手順をさらに有することを特徴とする請求項9記載のコンピュータ読取り可能な記録媒体。

【請求項11】 請求項1または2記載のファイル作成方法により作成された画像ファイルが記憶された記憶装置を制御して該画像ファイルを転送するファイル転送制御方法をコンピュータに実行させるためのプログラムを記録したコンピュータ読取り可能な記録媒体であって、前記プログラムは、前記画像ファイルにおける所定レベルの階層データに含まれるサイドチャンネル情報を取得する手順と、

該サイドチャンネル情報に基づいて、前記画像データにより表される画像の領域毎の重要度を判断する手順と、前記画像の領域毎に前記重要度に応じたレベルの階層データを転送するよう前記記憶装置を制御する手順とを有することを特徴とするコンピュータ読取り可能な記録媒体。

【請求項12】 前記サイドチャンネル情報を取得する手順は、比較的低レベルの階層データに含まれるサイドチャンネル情報を取得する手順であることを特徴とする請求項11記載のコンピュータ読取り可能な記録媒体。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、画像に含まれる所定領域の情報がサイドチャンネル情報として付加された画像ファイルを作成するファイル作成方法および装置、この画像ファイルの転送を制御する方法および装置並びにこれらの方法をコンピュータに実行させるためのプログラムを記録したコンピュータ読取り可能な記録媒体に関するものである。

【0002】

【従来の技術】蓄積性蛍光体シートやフィルムに記録された被写体の放射線画像を読み取って画像データを得、この画像データに適切な画像処理を施した後、画像を表示装置等により再生することが種々の分野で行われている。特に近年、コンピュータとの組み合わせによるコンピュータドラジオグラフィーというデジタルラジオグラ

フィアの技術が開発され、種々のデジタルラジオグラフィが臨床応用されている。

【0003】このデジタルラジオグラフィは画像データを定量的に解析することができるという点で、従来のアナログ方式のラジオグラフィとは根本的に異なる特長がある。特に人体の医療診断用として、このデジタルラジオグラフィの特長をより積極的に活用することを目的とした、計算機（コンピュータ）支援画像診断またはCADM（Computer Aided Diagnosis of Medical Image）と称される技術が提案されている。

【0004】この計算機支援画像診断等は、医療の現場における画像読影を通じての診断を補助するものである。すなわち従来においては、フィルム等の記録媒体やCRT等の表示装置により再生された放射線画像を専門医が目視により観察読影し、癌等を表すものとしての異常な腫瘍陰影や高濃度の微小石灰化陰影等（以下、これらを総称して異常陰影という）を早期に発見するよう努めていた。しかし、放射線画像を観察読影する読影者間の画像読影能力の差等により、そのような異常陰影を見落とし、主観的判断による思い違いを生じる可能性もある。

【0005】そこで計算機支援画像診断では、画像データに基づいて異常陰影と考えられる異常陰影候補を検出し、その検出した部位にマーキングを表示して放射線画像の読影者に注意を喚起することにより、あるいは読影者の客観的判断に役立つ材料として検出した異常陰影候補の特徴的なものを定量的に提示することにより、上述のような読影者による見落としや思い違い等を未然に防止して診断性能の向上を図っている（「DR画像における腫瘍陰影検出（アイリスフィルタ）」電子情報通信学会論文誌 D-II Vol. J75-D-II No. 3 P663~670 1992年3月、「多重構造要素を用いたモルフォロジーフィルタによる微小石灰化像の抽出」同誌 D-II Vol. J75-D-II No. 7 P1170~1176 1992年7月等参照）。

【0006】また、この計算機支援画像診断を行う装置において、画像データから異常陰影の候補を検出し、この異常陰影候補を含む領域を表す局所的なデータを抽出し、この局所的なデータを全体の画像とは別個に表示することにより、診断のための観察読影性能を向上させるようにしたものが提案されている（特開平8-294479号）。

【0007】また、照射野絞りをを用いて撮影を行うことにより得られた画像データに対して、照射野領域を精度よく認識するために、画像データに照射野認識処理を行うための補助情報を付与し、画像データとともにこの補助情報を受け取って照射野認識を行うようにした照射野認識装置が提案されている（特願平9-95619号）。

【0008】さらに、画像データにより表される画像における所望とする領域に対して画像認識を行って必要な

規格化処理条件を求め、この規格化処理条件に基づいて全画像データに対して画像処理を行うようにした画像処理方法が提案されている（特開昭60-120349号）。

【0009】一方、画像データの保存形式としては、JPEG、GIF、TIFF等種々の形式が存在するが、近年画像データを解像度または濃度分解能毎に階層的に分解し、各階層毎のデータ（階層データ）を符号化して圧縮保管する形式が提案されている。この保存形式は、具体的には画像データをウェーブレット変換等により複数の解像度毎あるいは濃度分解能毎の階層データに分解し、この分解された各解像度あるいは各濃度分解能毎の階層データを階層順に符号化して1つのファイルとして圧縮して保存するものである。

【0010】この保存方式は以下のような特徴を有する。

【0011】（1）従来のJPEGで用いられているDCT方式のように、画像データをブロック毎に処理していないため、ブロック歪みのようなアーチファクトが生じない。

【0012】（2）画像データが階層的に符号化されているため、画像データの転送の際に必要な解像度の情報のみを転送すればよく、効率的な画像転送が可能となる。

【0013】（3）画像データが多重解像度あるいは多重濃度分解能に分解されているため、周波数強調処理等種々の画像処理を比較的簡単に行うことができる。

【0014】（4）多重解像度解析による空間と周波数との同時分解が可能であり、符号化効率に大きく影響を与える低周波数領域に対しては広い範囲で直交変換を行い、高周波領域に対しては狭い範囲で直交変換が可能となるため、画像中のエッジ周辺部に量子化ノイズが発生しても、その空間的広がりを抑えることができる。このため、ノイズが知覚されにくい。

【0015】また、イーストマンコダック社が提案するFlashPixファイルのように、1つのファイル内に性質が異なる複数のデータを記憶することができるファイル形式が提案されているが、このようなFlashPix規格のファイルにも、多重解像度あるいは多重濃度分解能に分解された階層データを保管することも可能である。

【0016】このように、画像データを多重解像度あるいは多重濃度分解能に分解することにより、各階層のデータの解像度あるいは濃度分解能が互いに異なる複数レベルのデータから画像データを構成することができる。

【0017】さらに、同一の画像について再生画像の品質が異なる複数レベルのデータから画像データを構成することも可能である。すなわち、画像データを可逆的に圧縮すれば解凍することにより得られる画像データは劣化がなく、非可逆的に圧縮すれば解凍することにより得

られる画像データはそのサンプリング間隔に応じて劣化するものである。したがって、可逆的に圧縮するかあるいは非可逆的に圧縮するかによっても画像データの再生画質を変化させることができ、これにより再生画質を変化させた複数レベルのデータから画像データを構成することができる。

【0018】

【発明が解決しようとする課題】上述したように、画像における異常陰影候補の領域、照射野領域あるいは所望とされる領域を検出し、検出された領域に対して適切な画像処理を行うことにより、観察読影適正に優れた再生画像を得ることができる。しかしながら、上記特開平8-294479号に記載された方法においては、画像を再生する毎に画像データから異常陰影候補を検出する必要があるため、領域の検出のために長時間を要するものとなる。また、上記特開平9-95619号に記載された方法においては、照射野領域を適切に検出できるものの、検出するための装置に全画像データとともに補助情報をも転送する必要があるため、データの転送に長時間を要するものとなる。また、上記特開昭60-120349号に記載された方法のように、あらかじめ処理が施された画像データを取得するようにすればデータ転送時間や処理時間が長時間となる問題はないが、転送により取得した画像データはすでに処理が施されているため、処理前のオリジナル画像データに戻すことができないという問題がある。

【0019】本発明は上記事情に鑑みなされたものであり、画像中の所望とする領域のデータを効率よく転送するとともに、オリジナル画像データをそのまま保存することができる画像ファイルを作成する方法および装置、この画像ファイルの転送を制御するファイル転送制御方法および装置並びにこれらの方法をコンピュータに実行させるためのプログラムを記録したコンピュータ読取り可能な記録媒体を提供することを目的とするものである。

【0020】

【課題を解決するための手段】本発明によるファイル作成方法は、画像データを複数レベルに階層化して各階層毎の階層データを得、前記画像データにより表される画像の所定領域に関する情報をサイドチャンネル情報として前記各階層データに付加し、該サイドチャンネル情報が付加された各階層データにより画像ファイルを構成することを特徴とするものである。

【0021】ここで、「画像データを複数レベルに階層化する」とは、例えば画像データを多重解像度および／または多重濃度分解能に分解することにより、解像度および／または濃度分解能が異なる複数のデータから画像データを構成する、可逆圧縮したデータと非可逆圧縮したデータのように再生画像の品質が異なるデータから画像データを構成する等により、画像データを再生画像品

質、解像度および／または濃度分解能等が異なる複数の階層データから構成することをいう。また、本発明において、「高レベル」であるとは、上述した解像度、濃度分解能および／または再生画像品質が高いことを意味し、「低レベル」であるとは、解像度、濃度分解能および／または再生画像品質が低いことを意味する。

【0022】また、「所定領域」とは、例えば医療用画像における異常陰影候補の領域、照射野絞りをを用いて撮影を行った場合の照射野領域等、その画像において重要な被写体が含まれている領域のことをいう。

【0023】なお、本発明によるファイル作成法においては、前記階層データを例えばタイル領域のように複数の領域に分割することが好ましい。

【0024】本発明によるファイル転送制御方法は、本発明によるファイル作成方法により作成された画像ファイルが記憶された記憶装置を制御して該画像ファイルを転送するファイル転送制御方法であって、前記画像ファイルにおける所定レベルの階層データに含まれるサイドチャンネル情報を取得し、該サイドチャンネル情報に基づいて、前記画像データにより表される画像の領域毎の重要度を判断し、前記画像の領域毎に前記重要度に応じたレベルの階層データを転送するよう前記記憶装置を制御することを特徴とするものである。

【0025】なお、取得するサイドチャンネル情報としては、比較的低レベルの階層データに含まれるサイドチャンネル情報であることが好ましい。

【0026】本発明によるファイル作成装置は、画像データを複数レベルに階層化して各階層毎の階層データを得る階層化手段と、前記画像データにより表される画像の所定領域に関する情報をサイドチャンネル情報として前記各階層データに付加する付加手段と、該サイドチャンネル情報が付加された各階層データにより画像ファイルを構成するファイル作成手段とを備えたことを特徴とするものである。

【0027】なお、本発明によるファイル作成装置においては、前記階層データを複数の領域に分割する分割手段をさらに備えることが好ましい。

【0028】本発明によるファイル転送制御装置は、本発明によるファイル作成装置により作成された画像ファイルが記憶された記憶装置を制御して該画像ファイルを転送するファイル転送制御装置であって、前記画像ファイルにおける所定レベルの階層データに含まれるサイドチャンネル情報を取得するサイドチャンネル情報取得手段と、該サイドチャンネル情報に基づいて、前記画像データにより表される画像の領域毎の重要度を判断する判断手段と、前記画像の領域毎に前記重要度に応じたレベルの階層データを転送するよう前記記憶装置を制御する制御手段とを備えたことを特徴とするものである。

【0029】また、本発明によるファイル転送制御装置において、前記サイドチャンネル情報取得手段は、比較

的低レベルの階層データに含まれるサイドチャンネル情報を取得する手段であることが好ましい。

【0030】なお、本発明によるファイル作成方法およびデータ転送制御方法をコンピュータに実行させるためのプログラムとしてコンピュータ読取り可能な記録媒体に記録して提供してもよい。

【0031】

【発明の効果】本発明のファイル作成方法および装置によれば、画像データにより表される画像に含まれる所定領域の情報をサイドチャンネル情報として各階層データに付与するようにしたため、サイドチャンネル情報を取得することによりその画像における所定領域の情報を得ることができることとなる。このため、画像データに対して領域を検出するための処理を施す必要がなくなり、これにより領域を検出するための演算時間を短縮することができる。また、サイドチャンネルに所定領域の情報を付与するようにしたため、オリジナルの画像データは何ら処理が施されていない状態にて保存されることとなる。

【0032】また、本発明のファイル転送制御方法および装置によれば、まず、画像ファイルにおける所定レベルの階層データに含まれるサイドチャンネル情報が取得され、このサイドチャンネル情報に基づいて画像データにより表される画像の領域毎に重要度が判断される。そして、画像の領域毎に重要度に応じたレベルの階層データを転送するように記憶装置を制御するようにしたものである。例えば、重要度が高いと判断された領域については、高レベルの階層データを転送し、重要度が低いと判断された領域については低レベルの階層データを転送するようにしたものである。このため、重要度の低い領域についてはデータ量が少ない低レベルの階層データを転送すればよいこととなり、全体として転送されるデータ量を低減することができ、これによりデータの転送時間を短縮することができる。

【0033】また、比較的低レベルの階層データに含まれるサイドチャンネル情報を取得することにより、サイドチャンネル情報のデータ量を少なくすることができ、これによりデータの転送時間を一層短縮することができる。

【0034】さらに、階層データを複数の領域に分割することにより、重要度に応じて領域のデータを転送し易くすることができ、これにより効率よくデータを転送することができる。

【0035】

【発明の実施の形態】以下図面を参照して本発明の実施形態について説明する。

【0036】図1は本発明の実施形態によるファイル作成装置の構成を示す概略ブロック図である。図1に示すように、本発明によるファイル作成装置は、オリジナル画像データS0を階層化することにより複数の解像度毎

の階層データを得る階層化手段1と、オリジナル画像データS0により表される画像に含まれる所定領域に関する領域情報Aを作成する領域情報作成手段2と、領域情報Aを各階層データのサイドチャンネル情報として各階層データに含ませて画像ファイルFを作成するファイル作成手段3とを備える。

【0037】階層化手段1においては、オリジナル画像データS0は以下のようにして各階層毎の階層データに分解される。まず図2(a)に示すように、画像データSがウェーブレット変換されて複数の解像度毎の4つのデータLL1、HL0、LH0およびHH0に分解される。ここで、データLL1は画像の縦横を1/2に縮小した画像を表し、データHL0、LH0およびHH0はそれぞれ縦エッジ、横エッジおよび斜めエッジ成分の画像を表すものとなる。そして、図2(b)に示すようにデータLL1をさらにウェーブレット変換して4つのデータLL2、HL1、LH1およびHH1を得る。ここで、データLL2はデータLL1の縦横をさらに1/2に縮小した画像を表すものとなり、データHL1、LH1およびHH1はそれぞれデータLL1の縦エッジ、横エッジおよび斜めエッジ成分の画像を表すものとなる。そして、ウェーブレット変換を行う毎に得られるデータLLに対してウェーブレット変換を所望とする回数繰り返して、複数の解像度毎のデータを得る。さらに、このようにして得られた各解像度毎のデータは、例えば図3に示すように複数の領域にタイル分割され、その後、図2(c)に示すように各解像度毎に符号化され、符号化されたデータを階層データとするものである。

【0038】領域情報作成手段2は、オリジナル画像データS0により表される画像に含まれる領域に関する領域情報Aを作成する。例えば、図4に示すように照射野絞りの領域（以下照射野領域とする）4を使用して撮影を行った画像については、照射野領域4に対応する領域が抽出され、その領域の情報がビットマップデータとされ、このビットマップデータが所定領域に関する領域情報Aとされる。

【0039】ファイル作成手段3においては、領域情報Aがオリジナル画像データS0と同様に階層化されてオリジナル画像データS0の各階層データに付与される。この付与の形態としては、各階層データがRGBチャンネルに含められ、領域情報Aがサイドチャンネルに含められることとなる。そして、このように、オリジナル画像データS0の各階層データに領域情報Aの階層データを付与することにより画像ファイルFが作成される。

【0040】このように作成された画像ファイルFは、例えば光ディスク等の各種記録媒体に画像データを記憶する記憶装置や、画像サーバに記憶される。

【0041】次いで、本発明の実施形態によるファイル転送制御装置について説明する。図5は本実施形態によるファイル転送制御装置を備えたファイル転送システム

の構成を示す概略ブロック図である。図5に示すように、本実施形態によるファイル転送制御装置は、上述したファイル作成装置により作成された画像ファイルFが記憶された記憶装置6を含む画像サーバ15からの画像ファイルFの転送を制御するものであり、種々の入力を行うキーボード、マウス等の入力手段7と、転送の制御を行う制御手段8と、制御手段8からの指示に基づいて画像ファイルFに含まれる階層データを受信するとともに、制御手段8からの種々の指示を後述する転送手段13へ出力する受信手段9と、画像ファイルFを構成する画像データにより表される画像における領域の重要度を判断する判断手段10と、転送された画像ファイルFに含まれる階層データを復号化して復号画像データS1を得る復号化手段19と、この復号画像データS1に対して画像処理を施して処理済み画像データS2を得る画像処理手段11と、処理済み画像データS2をプリンタ、モニタ等の再生装置に出力する画像出力手段12とを備える。なお、記憶装置6には画像ファイルFを転送する転送手段13が接続されている。そして、記憶装置6および転送手段13により画像サーバ15が構成され、本実施形態によるファイル転送制御装置が画像サーバ15とネットワーク16を介して接続される端末17となる。

【0042】次いで、本実施形態によるファイル転送制御装置の動作について説明する。図6は本実施形態によるファイル転送制御装置を備えたファイル転送システムにおいて行われる処理を示すフローチャートである。まず、入力手段7から画像ファイルFを転送する旨の指示を入力すると、制御手段8はネットワーク16を介して画像サーバ15に画像ファイルFの転送を指示する（ステップS1）。転送指示を受けた転送手段13は、記憶装置6から画像ファイルFを読み出し、画像ファイルFを構成する各階層データのうち、低解像度の階層データのサイドチャンネルに含められている領域情報Aを端末17に転送する（ステップS2）。この領域情報Aは受信手段9を介して判断手段10に入力される（ステップS3）。判断手段10においては、領域情報Aに基づいて、転送される画像ファイルFを構成する画像データにより表される画像の領域の重要度を判断する（ステップS4）。本実施形態においては、図4に示す照射野領域4が重要度が高い重要領域であり、それ以外の領域は重要度が低い不要領域であると判断される。そして、この判断結果は制御手段8に入力される。

【0043】制御手段8においては、この判断結果に基づいて、重要領域については最高解像度の階層データまで転送し、不要領域についてはデータを転送しない旨の転送情報をネットワーク16を介して画像サーバ15に転送する（ステップS5）。画像サーバ15の転送手段13は、記憶装置6に記憶された画像ファイルFにおける各階層データにおいて、図7に示すように重要領域に

対応するタイル領域（図7の斜線部）のデータのみを最低解像度の階層データから最高解像度の階層データまで読み出して端末17に転送する（ステップS6）。

【0044】受信手段9は転送された階層データを受信して復号化手段19に入力する。復号化手段19においては、転送された階層データを復号化して照射野領域4に対応する復号画像データS1を得る（ステップS7）。復号画像データS1は画像処理手段11に入力され、ここで照射野以外の領域については黒く塗りつぶす画像処理（黒化処理）が施されて処理済み画像データS2が得られる（ステップS8）。処理済み画像データS2は画像出力手段12に入力され、再生に供される（ステップS9）。

【0045】このように、本実施形態によれば、画像ファイルFのサイドチャンネルに含められる領域情報Aに基づいて、画像ファイルFを構成する画像データにより表される画像の領域毎に重要度を判断し、この重要度に基づいて重要な領域についてのみ最高解像度の階層データまで転送するようにしたため、全体として転送されるデータ量を低減することができ、これによりデータの転送時間を短縮することができる。

【0046】また、本実施形態においては、画像データにより表される画像に含まれる所定領域の領域情報Aを画像ファイルFのサイドチャンネルに含めるようにしたため、この領域情報Aを取得することによりその画像における所定領域の情報を得ることができる。このため、画像データに対して領域を検出するための処理を施す必要がなくなり、これにより領域を検出するための演算時間を短縮することができる。また、サイドチャンネルに所定領域の領域情報Aを付与するようにしたため、オリジナル画像データS0は何ら処理が施されていない状態にて保存されることとなる。

【0047】なお、上記実施形態においては、不要領域についてはデータを転送しないようにしているが、低解像度のデータを転送するようにしてもよい。これにより、データを全く転送しない場合よりもデータの転送時間は長くなるが、高解像度の階層データを転送する場合と比較して、転送時間を短縮することができる。

【0048】また、上記実施形態においては、重要領域について最高解像度の階層データまで転送しているが、画像出力手段12が出力する再生装置の再生能力に応じた解像度のデータを転送してもよい。例えば、再生装置がプリンタである場合には最高解像度のデータまで転送し、再生装置がCRTである場合には最高解像度のデータまでは必要ないため、CRTに応じた解像度のデータまで転送すればよい。

【0049】さらに、上記実施形態においては、オリジナル画像データS0を解像度毎に階層化し、解像度毎に階層化されたデータを転送しているが、画像データが濃度分解能毎に階層化されて保管されている場合は、この

濃度分解能毎に階層化されたデータを転送すればよい。この場合、重要領域については高濃度分解能の階層データまで転送し、不要領域についてはデータを転送しないあるいは低濃度分解能の階層データを転送すればよい。また、オリジナル画像データS0を領域毎に可逆圧縮および非可逆圧縮したデータにより画像ファイルFが構成されている場合には、重要領域については可逆圧縮したデータを転送して高画質の画像を再生し、不要領域についてはデータを転送しないあるいは非可逆圧縮したデータを転送して低画質の画像を再生すればよい。

【0050】さらにまた、上記実施形態においては低解像度の階層データのサイドチャンネルに含められる領域情報Aを取得して領域の重要度を判断しているが、これに限定されるものではなく、所望とする解像度（例えば最高解像度）の階層データのサイドチャンネルに含められている領域情報Aに基づいて領域の重要度を判断してもよい。

【0051】また、上記実施形態においては、照射野絞りの領域に関する領域情報Aを各階層データのサイドチャンネルに含めているが、オリジナル画像データS0を再生して診断を行った際の医師の所見（丸や矩形等の図形情報）や腫瘍等の関心領域に関する情報を領域情報Aとして各階層データのサイドチャンネルに含めてもよい。ここで、医師の所見とは、医師がマウスやペン、キーボードによって入力した図形情報であり、関心領域とは画像中の腫瘍等の病変を所定のアルゴリズムにより自動的に検出した領域のことをいう。

【0052】このように、医師の所見あるいは関心領域に関する情報が領域情報Aとしてサイドチャンネルに含められている場合にも、上記実施形態と同様に領域情報Aを取得して画像の領域毎の重要度を判断した際に、医師の所見部分あるいは関心領域が重要領域、それ以外の領域が不要領域と判断され、重要領域については最高解像度の階層データまで転送され、不要領域についてはデータが転送されないあるいは低解像度の階層データが転送されることとなる。なお、この場合画像処理手段6においては、復号化された画像データに対して階調処理等の画像処理が施されるが、この画像処理は重要領域に対*

*してのみ施してもよく、画像全体に対して施してもよい。

【0053】さらに、上記実施形態においては、画像ファイルFを画像サーバ15に記憶し、画像サーバ15から画像ファイルFを転送するネットワークシステムに本発明を適用しているが、MO、ZIP、CD-R等の記録媒体に画像ファイルFを記録し、この記録媒体から画像ファイルFを読み出すようにしたシステムにも本発明を適用することができる。

10 【図面の簡単な説明】

【図1】本発明の実施形態によるファイル作成装置の構成を示す概略ブロック図

【図2】画像データをウェーブレット変換して階層毎に符号化する状態を示す図

【図3】画像をタイル分割した状態を示す図

【図4】照射野絞りを使用して撮影を行うことにより得られた画像を示す図

【図5】本発明の実施形態によるファイル転送制御装置を備えたファイル転送システムの構成を示す概略ブロック図

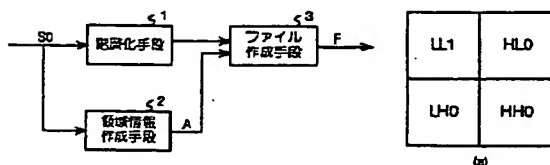
【図6】本実施形態によるファイル転送制御装置において行われる処理を示すフローチャート

【図7】各階層データ毎の重要領域を示す図

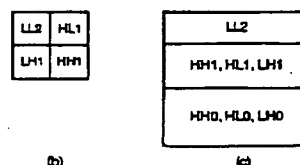
【符号の説明】

- 1 階層化手段
- 2 領域情報作成手段
- 3 ファイル作成手段
- 6 記憶装置
- 7 入力手段
- 8 制御手段
- 9 受信手段
- 10 判断手段
- 11 画像処理手段
- 12 画像出力手段
- 13 転送手段
- 15 画像サーバ
- 16 ネットワーク
- 17 端末

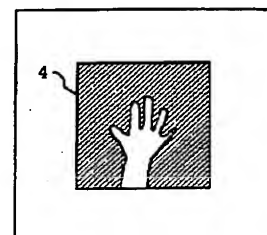
【図1】



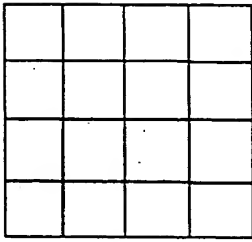
【図2】



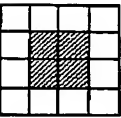
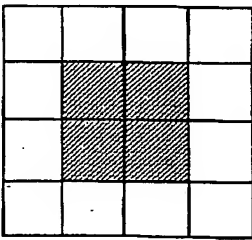
【図4】



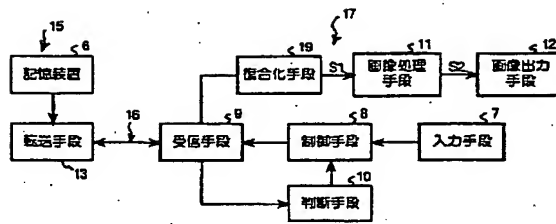
【図3】



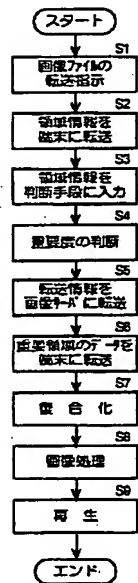
【図7】



【図5】



【図6】



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